SCIENCE AND INDUSTRY

ORGANIC GARDENING

STACKS

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J. I. Rodale, Editor | Sir Albert Howard, C.I.E., M.A., Associate Editor

With the Editor

EVIDENCE seems to be piling up that the method used in growing crops is the determining factor in producing the nourishing and healthful qualities of the food we eat, vitamin charts to the contrary notwithstanding.

In April of 1941 an experiment of tremendous significance was described by Professor Glen Wakeham of the University of Colorado before an American Chemical Society meeting at St. Louis, Mo. This experiment proved that garden beans and peas grown in poor soil had a greater mineral content than those grown in rich soil. By rich soil, of course, was meant soil that was "enriched" by the usual commercial or chemical fertilizers possibly with the addition of manure. I will quote certain parts of the bulletin issued by the American Chemical Society describing this experiment:

"Professor Wakeham sought to discover, if possible, some of the agricultural conditions which influence the mineral content of common foods. He planted samples of ordinary garden beans and peas, uniformly, in sharply contrasted soils. One was rich "bottom land," fertilized and well irrigated. The other was sandy "dry-land" soil, unfertilized and unirrigated.

"The result," he says, "was that while the total yields on the poor soils were only about one-third of those on the rich soils, the 'poor' beans and peas were considerably richer in mineral content that the 'rich' ones.

"This, of course, is only a single experiment and proves nothing in a general way. It merely suggests that certain foods, grown on poor soils, without artificial forcing of any kind, may be richer in essential minerals than more lush crops. Here is a field urgently calling for further research.

"While millions of dollars are spent annually in research to produce greater crop yields, and other millions to discover ways of disposing of the surplus crops thus produced, almost no attention has been paid to the nutritional values —particularly with regard to essential minerals—of the artificially forced and 'improved' crops obtained. If the present observations prove to be examples of a more or less general phenomenon, crops grown on 'poor' soils should command higher prices than those grown on 'rich' soils.

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"More fantastically," it has been suggested "that tribes and nations living in agriculturally poor countries—high, windswept plains, mountainous districts and arid semi-deserts—have usually conquered the inhabitants of the rich river valley and coastal plains because they have more 'iron in their blood and more grit in their bones.'

"For many years nutritionists have pointed out that many average American diets are likely to be deficient in calcium, phosphorus, iron, iodine, etc., causing such deficiency diseases as rickets, anemia, dental decay, and 'simple goiter.'

"Thousands of analyses have shown that while standard foods will usually contain fairly uniform amounts of the great food elements—proteins, fats, sugars and starch—their mineral contents may vary widely. Some samples of spinach, for example, contain seven times as much iron as other samples."

In other words it is impossible to issue a correct chart giving in exact micrometric measurements the amounts of the various vitamins in certain vegetables, fruits, etc., because this varies widely, depending on how the plants were grown.

It is rather paradoxical that the medical profession and its thousands of scientific workers are spending so much time measuring the amount of vitamins in various food products and formulating interesting principles regarding their application to health problems, yet disregarding the basis or foundation of the food products. Plants are not like money for example. A one dollar bill always means 100 cents. But two different pea-pods each representing the same weight do not have the same amount of vitamins.

One of these fine days the public is going to wake up and will pay for eggs. meats, vegetables, etc., according to how they were produced. A substantial premium will be paid for high quality products such as those raised by organic methods. It is possible that if you feed chickens on home raised feeds produced without the use of chemical fertilizers, instead of getting 40 or 50c a dozen your eggs will command 70 or 80c a dozen. The better-earning class of the public will pay a high price if they can be shown its value, and that they will save on doctor bills.

Dr. Alexis Carrel, in his world-famous book *"Man the Unknown,"* wrote:

"Chemical fertilizers, by increasing the abundance of crops without replacing the exhausted elements of the soils, have contributed indirectly to change the nutritive value of our cereal grains and our vegetables."

It has been proven that not only may food crops be grown without the aid of chemical fertilizers, but that when natural organic fertilizers are used, the food thus grown not only produces greater body resistance to disease when eaten by either man or animal, but the taste of the food is by far more delicious and natural.

In New Zealand practically all the farms are treated with chemical fertilizers. A few years ago, the Lancet, famous London medical magazine said, "In 1936 Dr. G. B. Chapman, of the Physical and Mental Welfare Society of New Zealand, persuaded the authorities of a boys' school hostel to grow their fruit and vegetables on soils treated with humus. This has since been done, and a striking improvement is reported in general health and physique, particularly as regards freedom from infections, alimentary upsets and dental caries."

In India, the Hunzas of the north have been found to have the best health and physique of the entire country. They are a "hardy, agile, and vigorous people," says Sir Albert Howard. "They have marvelous agility and endurance, good temper and cheerfulness. These men think nothing of covering the 60 miles of Gilgit in one stretch, doing their business and then returning . . . health and physique enjoyed by the Hunza hillmen appears to be due to the efficiency of their ancient system of farming." It was found that they return to the soil all human, animal, and vegetable wastes after being made into compost heaps.

According to Sir Albert Howard in his *Agricultural* Testament:

"At Marden Park in Surrey, England, Sir Bernard Grennwell has found that a change over to a ration of fresh home-grown food (raised on soil manured with humus) fed to poultry and pigs has been followed by three important results: (1) the infantile mortality has to all intents and purposes disappeared; (2) the general health and well-being of the live stock has markedly improved; (3) a reduction of about 10 per cent in the ration has been obtained because such home-grown produce possesses an extra-satisfying power."

From January 1940 to January 1942 Dr. J. W. Scharff, the Chief Health Officer of Singapore, conducted an experiment with 500 tamil coolies

who were fed vegetables and fruit that they grew themselves, using compost made by Sir Albert Howard's Indore process. Here is what Dr. Scharff says about it:

"Compost making was started on a large scale and during the months previous to the opening of the campaign a supply of over a thousand tons of compost was ready to launch this great experiment.

"During the course of the ensuing months, apathy and indifference, on the part of the laborers, gave way to interest and enthusiasm as soon as it became apparent how well plants would grow on soil rendered fertile with compost.

"At the end of the first year it was obvious that the most potent stimulus to this endeavor was the surprising improvement in stamina and health acquired by those taking part in this cultivation. Debility and sickness had been swept away and my men were capable of, and gladly responded to, the heavier work demanded by the increasing stress of war. But for the onslaught by the Japanese which overwhelmed Malaya I should have been able to present a statistical record of the benefit resulting from this widespread effort of vegetable culture on compost such as would astonish the scientific world. The results were all the more dramatic in that I had not expected this achievement.

"The numbers taking part in this venture were so large as to preclude any possibility of mistake.

"It might be argued that the improvement in stamina and health amongst my employees was due to the good effect of unaccustomed exercise or in the increased amount of vegetables consumed. Neither of these explanations would suffice to explain the health benefit amongst the women, children and dependents of my laborers who shared in this remarkable improvement."

At a large preparatory school near London, at which both boarders and day-boys are educated, the change over from vegetables, grown with artificial manures, to produce grown on the same land with Indore compost has been accompanied by results of considerable interest to parents and to the medical profession. Formerly, in the days when artificials (chemicals) were used, cases of colds, measles, and scarlet fever used to run through the school. Now they tend to be confined to the single case imported from outside. Further, the taste and quality of the vegetables have definitely improved since they were raised with humus.

The Compost Club Magazine of New Zealand draws attention in its July-August issue of 1943 to a very important experiment. The following excerpt from that magazine is abstracted from a paper by M. J. Rowlands and Barbara Wilkinson, of the Knightsbridge Laboratories, Sloane Street (evidently in Auckland, New Zealand), in the Biochemical Journal, Vol. XXIV, No. 1, 1930:

"Mr. Rowlands, having noticed that pigs grown on home grown ground barley and wheat did better than pigs on bought barley and wheat, decided to try the effect of artificial manure versus natural manure. The crop tested was, not barley or wheat, but the seeds of clover and grass; and the experimental animals were rats. Two groups of rats were fed respectively on the seeds from the artificially manured field and the naturally manured field; and the upshot was that, on the seeds of the naturally manured grass, the rats grew nearly twice as well as those on the artificially manured grass. Both preventive and curative tests were made."

"In July, 1929, the crops were cut in both parts of the field; harvested in separate barns, and threshed.

Analysis of Grass and Clover Seeds (per centages)

After natural manure:	
Protein	12.7
Moisture	5.8
Fibre	19.4
Ash	9.0
Phosphorus	0.44
After artificial manure:	
Protein	11.7
Moisture	6.0
Fibre	21.6
Ash	10.5
Phosphorus	0.33

Preventive Tests

"The rats were given Prof. Drummond's 'B. deficiency diet' which consists of rice starch, caseinigen, salt mixture and codliver oil, and with this, one lot got 20% of 'Dung Seeds' (seeds grown with natural manure), for 21 days, and thereafter 25% of 'Dung Seeds' for 11 days, whilst the other lot got the same weights of seeds grown with 'artificials', for the same periods.

Curative Tests

"Both lots of rats to be tested were given the 'B deficiency diet', with *no* seeds for 18 days, at the end of which all were losing weight. Then to the diet of one lot 25% of 'dung seeds,' were added, and they at once began to grow normally.

To the diet of the other lot 25% of seeds grown with 'artificials' were added: they did not improve, but got steadily worse. Three days later they looked as if they could only live a few hours. 'Their condition was one of typical vitamin B deficiency; they were wasted, hunched and shedding hair.' Then Professor Drummond saw them and suggested changing from seeds grown with 'artificials' to 'dung seeds'. The immediate result was that the rats rapidly recovered and showed normal growth.

"The authors observe 'It would seem that a plant may absorb vitamin B from the land, and that the vitamin B content of any food may be dependent upon the amount of this vitamin in the land'. The earlier view that 'the vitamin B is manufactured entirely in the plant and stored in the embryo' thus seems to be incorrect. Then they make this shrewd remark: 'One worker states that in his experimental work a certain food contains vitamin B; another worker, using the same type of food, differs entirely in his findings; and we consider that the food that is being tested is not the only point which is of importance. If these results are correct they have a considerable bearing upon agriculture and nutrition'.

"A further detail: They found that the dung of the pigs which they employed contained vitamin B. (They extracted it with slightly acidified 50% alcohol, concentrated the extract by distillation in vacuo, and then fed the concentrate to rats losing weight on the 'B deficiency diet'. The rats began to grow at once.)"

While these spectacular results were obtained by the use of manure, even a better outcome would have been effected had compost been used.

Sufficient evidence is at hand now to make it imperative for the Government itself to start research going to prove for itself what a raw deal the public is getting in connection with the food it is eating.

J. I. Rodale

Homework That Pays

What's whys and wherefores at the Borsodi School of Living
(Suffern, New York)

By Edward Skillin, Jr.

Reprinted From THE COMMONWEALTH

BAYARD LANE, a short winding black ribbon of a road, runs off route 202 about two miles east of Suffern, New York, and the main line of Jay Gould's Erie Railroad. It has an entrance sign so weathered that it is easy to whizz by it toward Haverstraw on the Hudson. The attractive homes it leads to can scarcely be seen from the highway this time of year, for the corn, shrubbery and sunflowers are high, the deep green foliage is thick. As you follow the winding road in, you will note that literally at every home or homestead the pavement ends. Whether symbolical or not, there is a marked division between the black asphalt of the lane and the pebbly, sun-baked, irregular private driveways.

When I reached the School of Living at the end of the lane and drew up to the fieldstone wall at the back of the building, a fine-looking woman, who proved to be the school director's wife, immediately turned from her backyard chores to bid me welcome. She smiled warmly as she came over to the top of the wall and introduced me to Paul Keene of the regular staff, who was seeing off a group of students. The School of Living Summer Session was breaking up. A score of people, the majority of them Quakers or Catholics, were

leaving for their homes in California, Illinois, Kansas, Massachusetts, Minnesota, New York City, Philadelphia, Texas, Vermont and Virginia. After six weeks of studying decentralist philosophy together, and of learning how to bake bread, make cheese, to grow and put up fruits and vegetables, to work in wood and weave cloth, to care for animals, maintain buildings and fences, not to mention taking turns at housecleaning and washing dishes, this group of kindred spirits was reluctantly disbanding. And so while Mr. Keene bade his associates God-speed, I climbed the walk to the white-framed school doorway.

In the background, seemingly within a good stone's throw of the Bayard Lane acres, lie the heavily wooded foothills of the Ramapo mountains. Nearer at hand were the half-hidden houses of the community, most of them built of native fieldstone and of exceedingly sound design. A fine looking brown and white cow was the feature of the landscape. So too were the various patches of corn and even higher sunflowers. Down the hill from the schoolhouse, I was to discover later, lies an extensive garden of corn, beans, cabbage, tomatoes, turnips, lettuce, squash and other commodities on which the staff and visitors subsist. But Mrs. Templin did not like to see me waiting outside unattended and insisted that I come in. The famous Borsodi wholewheat bread was in the baking and I was ushered into the compact modern kitchen to see the dough (which looked like Wheatena to me) coming out of an electric mixer.

Mr. Templin and Mr. Keene soon joined us, and we repaired to the bright, airy meeting-dining room and took chairs around a highly polished long table. Mr. Templin, who has recently returned from 15 years of rural education work in India, is Mr. Borsodi's successor as Director of the School, and his features reminded me a bit of the actor Claude Rains. We were soon joined by Professor Charles E. Toole of Pratt Institute, Brooklyn, one of the 15 Bayard Lane homesteaders and now treasurer of the School of Living. The round table discussion began.

Goats' Milk

One of the first topics we disposed of was goats' milk. Although I was brought up on the inimitable Billy Whiskers stories and was thus favorably inclined to that hardy animal, the beverage had never sounded particularly appetizing. There was little encouragement to be had from the reactions of that gourmet, Harry L. Binsse, either. At Suffern I found that there is a good deal of reason for the popular distaste for that extremely nourishing drink. It contains both milk and cream, as the two do not separate naturally the way cream rises from cows' milk. If not handled competently, goats' milk does have a strong tang, an unpleasant individuality of its own. Only if you are in the know can this aromatic flavor be circumvented. It seems that this is primarily the billy goat's fault; so much so, that people who have been around a buck goat for any length of time have a terrific job divesting their persons of his odor. So the first point is to keep billy and nanny beyond smelling distance. Next, the nanny goats must be kept clean and properly fed. It is also important to chill the milk while it is fresh.

Professor Toole told of a group of people who one night were served (every other one) cow's milk and goat's milk. The next night all of them had goat's milk without anyone being the wiser. This wasn't a case of gradually shifting the horse's feed to sawdust, either. In his opinion goats' milk is a somewhat smoother drink, and it is an established fact that it digests in one-third the time. There was reason for spending so much time on this question, for on a small homestead a two or three goat dairy is more practicable for the average family than a cow. A goat can be fed on from 4 to 10 cents a day, requiring one-eighth to one-sixth of the feed of an average cow; she is also much less susceptible to disease and, as is well known, can subsist on almost anything. "Two or three goats, if bred at different seasons, will supply the fluid milk needs of the average family throughout the year." Again, "if land and shelter are available, the total initial cost (of a goat dairy) need not exceed $50 for one goat or $85 for the purchase of two goats and the necessary equipment." Supplying one's own dairy needs is obviously one important plank in the Borsodi home production platform.

Family Savings

Mr. Keene had at hand a little blackboard which showed in tabular form the various savings to be effected by carrying out the home production program. And Mr. Templin hastened to point out that the figures would vary tremendously as personal efficiencies vary. The school through sev-

eral years of practical experiments has demonstrated that making all allowances for depreciation, interest on the homesteader's investment in place and equipment and for taxes, a family can by these methods save $542 a year; if they do their own laundry, $662 a year. Without laundry the extra work in producing at home requires 900 man-hours of labor. Taking the American average of some fraction over three adults per family, this would mean an hour a day new homework per person six days a week.

My informants did not seem at all amused when I ventured to say that it had struck me right along that the Borsodi program of the husband commuting to work in a nearby city and supplementing his modest income by producing at home meant that his wife had to do the homework. On the contrary my hosts stoutly maintained that in actual practice the men of the family do the bulk of the gardening and care of animals. At Bayard Lane the usual thing is for each family to have a small goat dairy and about 25 chickens. They have found that the average homestead, in addition to making savings so important for lower income groups, consumed 400 pounds per year more fresh vegetables than the average city family; and while the city family was eating 121 quarts of canned fruits and vegetables, much of this baked beans, the homestead family was digesting 431 quarts. Also the homestead diet included a much higher proportion of healthful fruits and vegetables. Quality, although not strictly measurable in dollars and cents, must never be ignored in these mathematical calculations. For the primary interest of these decentralists is in improving the well-being of those persons who participate.

When Ralph Borsodi started the School of Living, he had in mind the family with an income of $1,500 to $3,000 a year. His 25-cent bulletins on "How to Economize in Buying Land for Your Home," "How to Economize on Milk and Cream," "How to Economize on Bread, Cake and Pastry," "How to Economize on Canned Food," "How to Economize on Fruit," etc. are written on this assumption. But the thousands who have bought his various bulletins and the 5,000 on the school's present mailing list have been from almost every economic stratum. The savings possible for the $1,500-3,000 class would be even more important for the 60 per cent of American families that have to manage on less than $1,500 annually. That is why, it seems to me, the School of Living is growing in importance, for it is a center for learning widely practicable and useful techniques.

The School's Equipment

The trim of the attractive meeting-dining room is white, and the large wall spaces as well as the narrower intervals between the open French windows are filled with murals. At one end of the room there is a small panel depicting the smoke issuing from a gloomy factory with a city slum, at the other a large one representing a rolling expanse above the nearby Hudson. Mr. Templin called my attention to the symbolism suggested by the fact that the one mechanically propelled object in that idyllic country vista, a primitive steamboat, still relied to some extent on a sail to overcome the river current. Most of the other murals deal with real and imaginary homesteads in various parts of the United States.

The second floor of the school building, white clapboard above the brown fieldstone of the first story, contains several attractive bedrooms and baths; it accommodates 10 guests. The basement has equipment for a variety of important activities. Here one finds a number of hand looms designed for home weaving of woolens, linens, etc. Printing and mimeographing, pressing and laundering also take place down there. The wheat sent up from Peter Escher's biodynamic farm in Maryland and the home-grown corn are milled in the basement too, which also houses a cream separator. The fact that all this takes place in one small cellar shows how little space these handy implements require.

Biodynamic compost heaps form a prominent part of the Bayard Lane landscape. The soil was originally quite poor and is gradually being built up by this sound method of returning wastes to the soil. It was curious in this connection that in our walk around the garden we came upon a tomato patch which had unexpectedly grown all by itself on the site of an old pig pen. The animals had on occasions quite obviously fed on that important fruit. The size and profusion of these tomatoes put to shame the scraggly results of my own hopeful efforts with that commodity in a too-shady suburban backyard.

One of the most interesting plants in the whole garden is the Jerusalem artichoke, a sturdy green plant with edible

roots; it had already grown to 5 feet in height. Mr. Benjamin Muse of Dunedin, Virginia, one of the School's board of trustees, who sent the plants to Suffern, says they are so hardy and prolific that if the government once distributed batches of the plants to all the sharecroppers in the land, they would never afterward go hungry, and yet they would hardly have to lift a finger except to gather them in. Mr. Muse, who has 250 acres near Petersburg, Virginia, is making a comprehensive 8-year study of human subsistence levels.

Drudgery is Out

Across the road from the school stands Paul G. May's modest workshop, one of the most fascinating focal points of the whole community. Mr. May is experimenting now with a new type of electric stove and using it in his own home to check results at the family dinner table. The cooking process of his stove is much like that of the Swedish Aga stove. That is, it depends on steady heat, perfect insulation and utensils with bottoms so flat that they make perfect contact with the hot and simmer plates. In addition to hot and simmer plates, there is an enormous oven where temperature is even throughout. It takes Mr. May's stove one day to heat up and five days to cool off; it is going all the time. This 500-watt stove is ideal for rural electrification, where voltage is not high and where the loads put on local power plants at meal times by the present electric range would be far too great. Grants from the Bureau of Chemistry and Engineering of the Department of Agriculture support this experimentation and point to its importance. Electric appliance manufacturers have manifested great interest, too, and Mr. May seems anxious to get his stove into production; he apparently has no thought of personal royalties from patents. He also says that power companies would have to adjust their rates for this constant flow of current.

Another of his new gadgets is a log-sawer, with a one-quarter horsepower electric motor. The wooden parts are easily made at home, while the metal parts are available at a good hardware store. In the inventor's opinion it could be built from directions by any intelligent high school boy, and the materials themselves, motor and all, cost only $20. This machine will save a lot of backaches in building up the family woodpile.

Mr. May's home flour mill is also powered by a one-quarter horsepower electric motor. It stands about 3 feet high and takes up very little room. The perfected model now sells for $38 complete. Those who cannot afford this can procure a much cheaper hand mill. The school's inventor also does a sizable business in making looms for home cloth production. All in all, his workshop is a focal point, for one of Mr. Borsodi's key principles all along has been that the development of the machine now makes possible a return to home production without much of the drudgery that used to accompany it. Here is one of the principal answers to the basic human problem raised by the subjection of modern man to the machine of his own creating. It is often said in a vague general way that man must be master of the machine rather than the reverse, but here is one specific means making advances in practical mechanics genuinely beneficial to humanity.

There are many aspects of what you find at the School of Living that set you thinking. The war has temporarily directed attention away from the national unemployment problem, but once the long-sought peace is achieved, that problem will tend to paralyze the United States even more completely than in 1932. There is apparently no single solution, but it seems obvious that unemployment would be greatly alleviated if considerable numbers of the idle urban dwellers were settled on the land. They could not simply be dumped on a few acres to fend for themselves, but techniques similar to those of the School of Living would have to be supplied.

Homesteading can be successful if the soil is continually built up by biodynamic methods, if surpluses of all home-grown or home-produced products are put on the market, and if they are processed as far as possible toward the finished product, before being offered for sale. Even for cash crops the School of Living is opposed to specialization. In all this Borsodi Bulletins have proved invaluable sources of essential and convenient information.

Back to the Land

In getting people from demoralizing idleness in the city to self-subsistence on the land, Professor Toole says no one is quite so helpful as the county agent. He told of an urban friend of his who knew absolutely nothing about agriculture but decided to buy and work a farm. He was advised

to get the county agent out to his place first thing. The official obliged by going over the whole place, telling what, and where and how to plant and offering to be always available for consultation. One day the cow wouldn't milk so they got the agent on the phone. "Give her a drink of water," he told them, and it worked like a charm. Within 8 months the fugitive from the city has developed from a comparative ignoramus into an honest-to-goodness farmer. Further assistance may be obtained from the free bulletins of the Department of Agriculture, from the Biodynamic Association of America and others. You can learn a lot if you're willing and know where to ask; county, state and national governments give lots of free service in these matters.

When I brought up the question whether lone individuals could pioneer on a homestead, the consensus seemed to be that while it can be done, people are likely to be more successful if they establish in a small community—something from 10 to 50 families. Not only can there be such helps as a community power plant, a mill for wheat, a cooperative exchange and the like, but also community recreation and more satisfying social activity. Many of the savings indicated in the School of Living Bulletins can even be achieved by homework in a city apartment.

At one point in the discussion Mr. Templin dilated on the effects of home production on the outlook of the people who participate. He spoke of such achievements, with the new sense of self-reliance, consciousness of creative action, greater satisfaction in living they embody. As Mildred Jensen Loomis said at the summer session, homesteading makes for integral living. And in an age of narrow specialization it enables the individual to enter directly into a wide range of the basic processes of society. When this point has been reached, work is not drudgery but joy. Mr. Templin's clear blue eyes widened as he told of villages in the Himalayas where the natives spontaneously sing at their humble work. He believes that some of these distant communities have reached the greatest degree of self-subsistence, of successful communal life, yet attained. He compares them with the New England of town meeting days. But the organization of these Indian communities is more comprehensive; their democracy embodies economics as well as politics. Mr. Templin says that Gandhi himself is more interested in economics and decentralism than he is in India's political independence.

Beautiful as they are, the Ramapos must be a comedown after the Himalayas. But Mr. Templin and his wife and Mr. and Mrs. Keene receive virtually only their living expenses for staying on at the School of Living. And who will say that there is not an even bigger job to do over here, at this turning point in the course of Western capitalism. They feel the staff will be complete if they can find a printer and his wife willing to join the community on similar terms.

Recent converts to the movement are A. J. Muste and other leaders of the Fellowship of Reconciliation. These peace leaders believe a direct attack on the causes of war must be made by non-violent methods. They insist today that non-violence and passivity are not equivalent. If any sizable proportion of the capitalistic world is reorganized on a decentralist, homesteading basis, the tension resulting from the struggle for raw materials and markets will lessen and there will be far less of an uprooted proletariat prone to be carried away by dictator's promises or eager for the adventure of war. The tragic cycle of depressions and war brought on by modern industrial "efficiency" must give way before the greater efficiency of using the machine to make life more abundant for both family and community. These are some of the ideas bruited about as the lively talk goes around the discussion-dinner table at the School of Living. And whether you agree with them all or not, you recognize at once here a tremendous potential for rebuilding society at a time it never was more needed. The thing is to embark on a little home production of your own.

Perennial Vegetables

By Eva Beard

From The N. Y. TIMES

PERENNIAL vegetables are time-savers for the busy Victory gardener and, in addition, they provide a welcome change from annuals that are planted every year. A bed of perennial vegetables—some small fruits and salad patch—if well planned and made as complete as possible—will prove to be surprisingly adequate, giving bountiful returns for small labor and expense. Much of the planting can be done in late summer or autumn.

The perennials require more space than annual crops. They may include a fifty-foot row of asparagus for a family of four; about a dozen plants of rhubarb; about twenty-five feet each of dandelion and garden sorrel; a good row of chives, perhaps five feet, since the green tops of this little onion are outstandingly useful in spring salads; a small quantity of shallots, the mild-flavored, hardy little onion preferred by French cooks; a small patch of perennial onion to provide earliest spring scallions, and a few roots of horseradish. A corner might be given over to a dozen or so tubers of Jerusalem artichokes which spread rapidly and must be kept in check. A small quantity of large rooted chicory will provide an additional salad plant for early spring, and the roots may be used as a substitute for coffee.

English Perennials

Several plants common in English kitchen gardens might be added to American perennial plantings. These include patience dock, called herb patience, which is less acid than its cousin, garden sorrel, and the chenopodium called Good King Henry or Mercury, which is still much grown in Scotland where it is preferred to spinach. It is related to our own wild lambs' quarters, and gives an ample supply of excellent early greens.

Sea kale, a perennial of the cabbage family, grows wild in abundance on certain parts of the English coast, where the inhabitants pre-empt rights in it, cover the plants with shingle over winter and sell the blanched shoots in the early spring market. The plant is also extensively grown commercially. The shoots, which appear several weeks earlier than asparagus, are served in the same way. Root cuttings, if they can be obtained, provide the quickest means of getting a crop, since seedling plants require three years to grow before cutting. Rich soil and good fertilization increase the yield of this crop.

Perennial herbs that are especially welcome include sage, marjoram, thyme, mint, winter savory, burnet, lemon balm. Tarragon is not dependably hardy but since it is so useful a condiment it is worth a little trouble. Once established it often forms large bushes which survive sub-zero winters. Also, there is sage, which again, is not dependably hardy.

The Raspberry

Among small fruits for perennial planting are everbearing raspberries in varieties that include black raspberries. Since the everbearing varieties fruit very early and repeat in late summer or autumn, the raspberry season can be extended over most of the summer.

Cultivated mustards are liberal self-sowers. An excellent and not sufficiently planted salad is the dry land or "upland" cress, which is a biennial completely winter hardy. It reproduces itself easily but as the tufts of leaves are not very large, needs to be planted in some quantity.

Hints For the Victory Gardener

This is the tenth of a series of articles by this author dealing with the cultivation of ordinary vegetables.

By Roger W. Smith

RHUBARB

EVERY good kitchen garden should have a row or two of rhubarb, sometimes called pie-plant. Good gardeners value it for the ease with which it is grown and for the pleasant amount of citric acid which the thick stems of its luxuriant leaves contain. Citric acid is especially valuable these days when the usual citrus fruits, lemons, grapefruit, etc. its usual source, are difficult to obtain. You will notice, also, that rhubarb thrives in temperate areas where the citrus fruits cannot be grown.

The ancient Greeks named rhubarb, "barbaros" or "the rough foreigner," when it was introduced to them from what is now Siberia where it grew in the wild state. Commonplace as rhubarb may seem to many gardeners, it is still considered a strange and wonderful plant in many places. Various species of rhubarb are cultivated for many reasons. Some twenty five species are grown in various parts of the world as ornamentals. Their striking foliage is held in high esteem in many countries where they are used on lawns or in flowerbeds much as you would plant cannas or small ornamental shrubs.

Some species of rhubarb are also grown for medicinal purposes. The Chinese species is now used almost exclusively for its medicinal root products although several others, notably Turkey rhubarb, have been substituted from time to time.

Rhubarb is a relative of such widely diverse plants as buckwheat and sorrel (sour-grass), the latter being also a producer of acid-containing, edible vegetable material.

Rhubarb is easy to grow but you will find that it requires a deep, very rich neutral soil which is well drained. It is, as you would expect, a gross feeder for it makes great and rapid growth during its growing season. It demands also an adequate supply of moisture and sunshine during its growing season.

To start a new planting, it is customary to secure one root piece for every three feet of row, and the place where they are to be set may be best arranged the previous year. In making this arrangement it is a good plan to dig a four-foot deep trench the length of the row. This trench should be made at the side of the garden so that the planting of rhubarb will not interfere with the cultivation of other garden plants. Into this trench should be placed all kitchen scraps, garbage, etc. as they occur, horse manure if it is obtainable. Of course, if you have an already established compost heap, composted material is to be preferred.

But lacking an established compost heap, kitchen scraps, raw manure, whatever is available may be placed in the trench to a depth of about three feet and immediately covered with a thin layer of compost humus or sifted top soil. By April or May of the following year you should have a shallow trench of suitable length, about a foot deep, with a foundation of two feet of partially broken down organic material. Over this foundation should be placed an inch or so of mature compost humus. The root pieces should then be placed, watered well, and covered with a three inch layer of compost humus. Sifted top soil may be substituted if the amount of compost material is limited.

If you have taken over an established row of rhubarb, you will find it well to consider the probable age of the planting. If the clumps are over six years old it will probably pay you to dig them in the early spring and break up the huge clumps with an axe, keeping one or two eyes to each root-piece. These root-pieces may

be replanted three feet apart, and you will have a lot left over.

But it is best to study the row before you dig it. Perhaps it would be best to dig and replant only a part of the row? Which of the clumps produces the largest leaf stalks? Which clump had the finest flavor? The best color of leaf stalk? If you select for replanting only root-pieces from outstanding clumps you will find that you will be able to improve the type of rhubarb you grow by root selection.

Discarded root pieces are often very thankfully received by new gardeners, who will use them under slightly different conditions and through root selection eventually produce plants which may prove also of superior quality. For unlike many plants, rhubarb may be vastly improved through selection and local conditions. In any case the periodic division of the root-stock is essential to the growth of large, succulent stemmed leaves. Without this practice, the plant declines slowly and the leaf stems become thin and lacking in flavor and much of the plant nutrients go into the production of the seed and the seed stalk which is natural.

This seed stalk, of course, should be immediately removed from your plants when it arrives as it is sure to do if the planting is an old one. But suppose you are of the enquiring mind. You wonder what might happen if you permitted the seed to form and saved it for the production of seedlings. This is an interesting proposition, the more interesting because most of the improvement of rhubarb is done through the selection of root pieces and because many types of rhubarb notably the MacDonald do not produce fertile seed. Plants grown from root pieces also have the advantage of producing usable stalks a year or two earlier than plants grown from seeds.

Might one not, you ask yourself, plant a row of the Ruby type which produces rather small, very red leaf stalks, and another row having a very large leaf stem of the "baseball bat" size, through crossing and seed saving produce an altogether superior type of red-stemmed rhubarb? This is an interesting matter to try out.

Rhubarb seed takes from twelve to fourteen days to germinate. It should be covered with three-quarters of an inch of sifted compost humus. Rhubarb plants grown from seed should be as carefully cared for as other seedlings, and the young plants transplanted the following Spring. The seedlings take one year to mature and in the time which must elapse before they bear a crop of sizeable leaf stalks you will have to wait with patience to see whether or not there is amongst them a few really fine plants.

Rhubarb is greatly appreciated out of season. The winter demand for it will most likely be great since citrus fruits, usually considered a necessary part of our winter diet, will be unavailable or at least scarce for some time to come. Rhubarb does not grow in the winter time, therefore it is forced into growth in order that we may have the benefit of the anti-scorbutic acid its leaf stems contain. How should the Victory gardener do this forcing?

There are several methods by which rhubarb may be forced into growth during its dormant period. Barrels or boxes may be inverted over the dormant plants during late winter to shelter the plants and to cause them to produce extra early shoots. Commercially this added shelter is increased to a point where temporary, steam-heated covers are placed over the rows.

A very good plan for a small garden is to dig a few old clumps and place them in sand boxes or cover them with sand in a cellar or basement. Here, according to the amount of heat and moisture they will grow fine tender stalks whilst the snow piles up against the basement windows. Many gardeners with greenhouses make a practice of planting a few rhubarb roots beneath their benches in the late fall.

Shallow cultivation is best, just enough to eliminate weeds which will be few if the plants receive a mulching of rich compost humus every spring. Rhubarb does not object to raw horse manure either as a mulch or dug in before planting. But the plants had best be mulched lightly in the fall to prevent frost from penetrating too deeply into the root system. Many gardeners fail to do this slight duty and lose much thereby. A little care, a trifling consideration, goes a long way.

A planting of rhubarb will remain in good condition up to about ten years if it is not harvested too severely. You will find it best to limit the pulling of stalks to an eight-week period each year, to remove the flower stalk promptly will do much to cause your planting to thrive.

Rhubarb is little troubled

by either insect pest or plant disease. But it should be well supplied with natural plant nutrients through the liberal use of mature compost humus. Stalks should be pulled, never cut or broken off no matter what the temptation. The stubs remaining from the cut or broken-off leaf stems are likely to rot and perhaps introduce this condition to the root system with serious damage in a wet soil.

And when you have produced a fine crop of bright red stems you will likely be dismayed at the thought of how much sugar their proper preparation will require. If you have to reduce the acidity of the stems to fit the sugar budget perhaps the best way, a very old way, is to prepare the stems for cooking, then pour boiling water over them and let them stand for ten minutes. After that time the water should be poured off. As a result of this treatment the acid content of the rhubarb will be so lowered that only about half the usual amount of sugar will be required.

But whatever method you use in the preparation of the rhubarb you grow you may be sure that the setting out of a row or two will richly reward the slight effort its planting and care required, that your health will benefit from the valuable material so generously offered you at harvest time.

EDITOR'S NOTE—It is not advisable to eat too much rhubarb as it contains oxalic acid which is bad for the kidneys.

Recent Corrobation of Organic Methods

By Roger W. Smith

AS you know the mychorrhizal association has long been considered an important factor in organic gardening. Some years ago Sir Albert Howard, then Director of the Institute of Plant Industry at Indore, discovered the tremendous value of this plant-fungus association. He explained his investigation in his magnificient work "An Agricultural Testament".

During a test of the Indore method of composting, it was found that the use of as little as five tons of mature compost spread over an acre of ground resulted in a very surprising and *immediate* increase in the fertility of the soil involved.

Sir Albert Howard eventually demonstrated that this great increase in fertility was the result of the very rapid increase in the formation of microscopic soil fungi, mycorrhizae, associated with the roots of young plants. He made interesting tests of the value of the mycorrhizal association so far as it concerns the growth of the young plants of cotton, rice, grape, sugar, banana, tea, cocoa, coffee and many others.

Even small amounts of properly made compost humus were sufficient to inoculate the surrounding soil and to make conditions more suitable for the formation of these soil fungi. On the other hand, it was found that the use of chemical fertilizers hindered the growth of the mycorrhizae and that without them, even though ample phosphorus was present in the surrounding soil, it was not immediately available to the plants. When chemical fertilizers were used there was usually no fungus-root association or if there was it was defective often because of the weakness of the plant itself. And a weak plant is a serious matter.

A weak plant usually lacks the necessary material for its proper growth. It must, therefore, be lacking when used for food either by man or animal. It is a curious fact that plants forced into growth by the use of artificials often produce no seed, or if they do, the seed has little viability—vitality. This is a most certain indication that they are of little use as foodstuffs.

But the use of artificials often do cause the formation of quantities of leafy material. It was about this point that Sir Albert Howard was interested. In his tests he showed that animals fed a diet of feeds produced by the use of artificials had usually poor health. He brought oxen suffering from hoof and mouth disease into

contact with oxen raised exclusively upon vegetable material produced through the liberal use of compost humus and showed the latter group to be immune to infection.

In the same way, he shows that human beings subsisting upon a diet of vegetables, and the meat of animals fed upon vegetable materials, produced by the use of artificials had very poor health compared with a group subsisting upon a diet of foodstuffs produced with the exclusive use of compost humus. Actual tests made with groups of children in boarding schools supplied with ample vegetable material produced the organic way were practically immune to colds, measles, scarlet fever, bad teeth, and the like, whereas a group using foods produced the usual way, i.e. with artificials, often suffered severe epidemics of the same diseases.

The health of the individual depends very greatly upon the health of the vegetables consumed. The health of the plant growth depends very often upon its healthy mycorrhizal association, which in turn is brought about by the liberal use of mature compost humus.

The importance of this mycorrhizal association has recently been very neatly demonstrated by a modern scientist, Prof. A. L. McComb of the Agricultural Experiment Station: Iowa State College of Agriculture, Forestry Section, at Ames, Iowa. An account of the interesting work of Prof. A. L. McComb, an authority on forest plant growth, is contained in Research Bulletin No. 314, April 1943, issued by the Iowa State College, Ames, Iowa.

Prof. McComb found that pine seedlings failed to thrive unless they received a mulching of pine needles—organic humus would most likely have given even better results. He found also that only those plants which received this mulch thrived. He found that this mulch brought about a great increase in the amount of mycorrhizae present in the short roots of the seedlings, that those seedlings having little or no mycorrhizae failed.

To further corroborate the work of Sir Albert Howard, Prof. McComb, demonstrated that mycorrhizal seedlings contained four times as much phosphorus as surviving non-mycorrhizal plants. He demonstrated that the presence of mycorrhizae on the short roots of the plants made available phosphorus in the soil which would otherwise be locked up.

Much work yet remains for other serious workers studying this matter of plant health, but already it is clear that better health for all of us can be brought about by the exclusive use of those vegetables produced through organic gardening methods.

With Sir Albert Howard

Question

ENCLOSED is a letter which asks an important question as to how certain types of compost would be created by using certain types of animal manures. Your opinion would be very much valued as I think this is an extremely important point.

(EDITOR'S NOTE)—This reader wanted to know whether by using certain raw materials in making compost he would end up by having humus rich in potassium, or by varying the raw materials obtain a product favoring nitrogen, or potash, etc.

Answer

Your correspondent is looking at a complex *biological* problem from the angle of chemistry which deals only with a minor aspect of the question. A small tail is wagging a big dog! The problem of crop production is to feed the soil population — earthworms, fungi and bacteria and so forth—who in turn feed the plant. If we look after the soil population, everything else will follow. If we try to feed the plant direct, as with chemical fertilizers, Nature's reaction is loss of quality followed by disease. Properly prepared compost, therefore, is all that the soil needs.

Ground bones may be regarded as an organic manure and are preferable to acid superphosphate, which soon harms the soil.

Question

I recently saw a picture in the newspapers of Lloyd George supervising a group of girls planting whole potatoes. I checked thoroughly with a friend of mine and he stated

that this was the natural way of planting potatoes and not the way it is commonly done in this country of cutting up and planting only the eyes. What is your opinion of planting whole potatoes as against cutting them up?

Answer

The big growers in South Lincolnshire always plant the whole potato after it has been sprouted in a greenhouse. They call the sprouting process "chitting." The sprouts are about one-third to one-half inch long and very wide at the base. This hastens the crop by many days.

The following note from a letter of Sir Albert Howard deals with the Petty Method of making compost. It is in all respects the same as the Indore process, except that it has an aeration chamber under the heap with an air outlet leading to the side, to furnish an air draught. The excerpt follows:

I have just tried the Petty Method in small heaps, i. e. in the New Zealand box containing 54 cubic feet of finished compost. The result was negative. One of my correspondents has confirmed this, so you might put in a note in *Organic Gardening* to this effect. I am writing to New Zealand about it and am enquiring whether they made controlled experiments. For very large heaps it might work very well. A correspondent is trying it out on big heaps and I hope soon to hear the result. I shall be interested to know about results in the U. S. A.

Question

In connection with the chicken cuttings, feathers, heads and feet of chickens regarding which I received your kind advice some time ago, we find that with our tractor, we will be able to make trenches about a foot deep in a field where we put the stuff and close over the trenches. Due to the way the tractor works, these trenches are about three feet apart from edge to edge. If this whole ten acre field is done that way and then a crop of corn is put in, will it be affected by the fact that the entire surface is not treated with this fertilizer material but only the trenched part? Naturally when we plow for the crop, some of it will be turned so that it will be spread a little more, but no doubt, there will be parts between the trenches that will not receive any of the fertilizer material direct. What would be the effect?

Answer

I think the trench manuring you suggest with chicken residues will give you an amazing result. The humus so produced will be spread in the soil by earthworms as well as by later cultivation. One of the most remarkable orchards near London is on poor, hungry sand, in which the dead dogs and dead cats from a local mortuary are buried. We call it the cemetery. The effect on the trees and on the fruit is simply amazing. Such material should not be buried too deeply.

Question

Enclosed herewith is an article which you need not return entitled "Keep an Eye on Your Spuds." I am referring in it to the statement "It was this same late blight of potatoes which brought on the famed Irish potato famine back in the 1840's."

Would it be possible that some sort of artificial fertilizers were used in Ireland in 1840 or would there be some other condition that might cause such a blight? No doubt, some of our readers may refer to this some time or other and we would like to get your view point.

Answer

Artificials were not in use in 1840, but the Irish peasants are not very good cultivators and might have allowed their soils to deteriorate. In this village of Heversham there is a plot which has grown potatoes continuously for over forty years. No disease and no loss of vigor or quality. The owner the other day showed me over and in the course of conversation said, "Let me introduce you to my head gardener." He pointed to a heap of cow-dung and said, "Cow muck, my head gardener." I imagine if the Irish had carried out the excellent principle implicit in the above, there would have been no blight in 1840.

Question

One of our readers who sells charcoal for use in compost piles, writes and says that charcoal has a number of advantages. For one reason he states it absorbs ammonia gas and would seem to be beneficial to hold a small amount of ammonia gas at least. Would you agree with this statement?

Could you give any other information as to the possible harm or advantage of using charcoal in the compost heap?

No doubt, farmers who make compost on a large scale would not be interested, but if there is any slight advantage, perhaps gardeners, who make small amounts of compost, might want to add some.

Answer

I once did some experiments with charcoal, but the results were negative. It might, however, if finely divided, be of use on heavy clay soils to improve the permeability.

An Old Fashioned Garden

By Dr. James Faulkner (Naturist & Food Scientist)

I began life on a farm in the Ozarks of Missouri more than 50 years ago. My first 23 years were spent on this farm where I learned many, many things about the production of foods, such as are grown on a diversified farm. Some was hill land and some valley. Many times I found a tomato vine, squash or fruit tree or vine growing in the wild that did better than those we had given all manner of attention. For generations my people had been farmers, pioneering across America. So growing and planting things comes natural to me, and many of the old fashioned ways of farming suit me best.

Father was a good farmer and knew that he could not always take from the soil without returning something to it. So he rotated his crops and often plowed under a crop of stock peas or red clover to build up depleted soil. He used animal fertilizer too, but there was one object lesson came to me that I have profited by in later years. I had a small planting of prize corn. One section of this I fertilized heavily with barn yard manure. This corn grew rank but ears were not well formed and the bugs and insect pests nearly ate it up. Whilst the corn nearby not fed by animal fertilizer was perfect and had no bug pests. I remembered this when later I was taking a study of Nature Cure under the late Dr. Henry Lindlahr, and he told of his clean soil garden experiments.

Dr. Lindlahr claimed food grown on clean soils was sweeter, less free of acids, and was not subjected to so many plant pests. And again I recalled that on the Missouri farm the rank growth of grass that came up in the pastures where dung or urine had been deposited by the grazing animals—was left untouched. Later I read a little book by Mr. Geiger on "New Soil Culture" where he advocated no cultivation that would disturb the surface roots and advised mulching of leaves, weeds and dead grass at the base of the plant. And again I remembered the wonderful success we had with potatoes planted under a layer of wheat straw on the old farm and how the strawberries grew so nice when mulched with straw. Then later Earthworm Culture was brought to my attention. Then I knew I was getting somewhere in accumulating some worthwhile information on correct gardening. And it all came back to the things we already knew to do on the old farm (just good common sense farming, that had not been *scientifically tabulated*).

So here in Pasadena, between patients, I have a small back yard garden where I pull off my shoes and have a lot of good wholesome fun playing with the soil and incidentally grow greens I am not afraid to eat—for I use no poison sprays on them. In this garden I have lettuce, carrots, salsify, parsnips, tomatoes, summer squash, endive, dandelion, kale, roquette, parsley, chives, beets, sorrel, mint, basil, sweet marjoram, sage, rosemary, tansy, balm, etc., red clover and alfalfa.

Here in California, of course, we can garden the year round, so I rotate my things changing to different plots from time to time. And I expect to have better and better soil each year.

I shall tell here of the things I have done since last fall to build up my soil. California is

a great bean country, so I got two or three bales of bean straw and buried it in trenches in the garden, and some of the straw was saved to mulch between vegetables. The soil was loosened well and trash spaded under and that was the extent of cultivation. Weeds and grass were cut or pulled and used as mulch between plants. Leaves and other trash were scattered on the ground. Wood ashes from burning of trash and from two small wood stoves are scattered over the ground from time to time. The ashes give valuable minerals and discourage the activities of slugs and snails. Yes, there have been some pests, but I seem to handle them nicely without poison sprays.

Right now I have sowed thickly the black eyed pea or bean, in all the vacant plots and between vegetables which soon will be harvested. These beans germinate quickly, have a good spread of roots and a quick rank leaf growth. Some of these will soon be spaded under where fall vegetable seed is to be planted. On other little plots crop after crop of these will be grown and used (the tops) for mulching. Water troughs or depressions are made between the rows of vegetables, so as not to water the tops too much during the hot weather. I also have a large can of nails which I move around from place to place for the rusty water to wash off with the idea it will supply something to the soil.

While I have not bought any thoroughbred or educated earthworms to add to my soil, I find I have lots of those that were originally there when I first spaded it up, and they are active and working any place I lift the mulch or spade where the soil is moist. I shall not insult these worms or discourage their activities by filling my soil with the commercial fertilizers. Nor shall I invite the pests and bugs by using animal fertilizers. However, I am sure the green manures are more conducive in eradicating bug pests than are those rotted and worked over by the earthworms.

My more than 20 years of treating the sick, specializing in food and nutrition, convinces me that we must do more than tell people what foods to eat; we must teach the food producer how to grow foods the clean soil way. Largely for this reason I have my own vegetable garden. It and my sun cookers are a simple pattern of life and way of living I present to my patients and friends as an example for them to duplicate.

EDITOR'S NOTE—Sir Albert Howard advises that unless manure or other animal matter is included in the compost, trouble will eventually ensue. In this article, the author draws attention to rank growth caused by the use of raw manure. We do not advocate the use of raw manure. It should be composted first.

Our Experience with Earthworms

By Ross W. Barcus

IN 1938, we purchased two abandoned farms. One 67 acres, and the other 27 acres. These farms had not been worked for over 50 years, except for a few acres of bottom land which is overflowed by the Ohio River back water. We had 2 acres cleared and built our home in 1938, but did not move in until 1939, as we had a general store and the postoffice for 10 years, and had to dispose of these before moving. This land was a regular jungle—so poor, with no top soil except a little layer of leaf mold which disappeared with the first hard rain.

In the fall of 1938 we purchased 100 assorted fruit trees —apple, peach, pear, plum, apricot, sweet and sour cherry, quince, grape vines and many kinds of berries. It took hard labor to set these trees out, as I had to dig all the holes with a mattock. There was no soil to speak of, just yellow clay and sand stones. We put plenty of lime and bone meal around each tree, and purchased two truck-loads of barnyard manure from a farmer. Then we dug ditches, 18 inches deep, between the rows of trees to run the surplus water off over the river hill. We then got several truck-loads of hardwood sawdust from our saw mill set, as we had about 30,000 feet of good lumber for

the framing and sheeting of all our buildings. The sawdust was used for litter in our poultry house, and around the feeder roosts, and was later put between the rows of fruit trees. The trees grew very little the first year. We lost 12 trees, but these were reset with new trees the following spring.

In the fall of 1938 we purchased several hundred baby chicks; the best chicks we could find, from old reliable hatcheries. We had an old age pension man to look after the chicks until we moved. However, we lost about 50% of these chicks after they were half grown. They had contracted such diseases as range paralysis, big liver, tumors, etc. These chicks were raised in battery brooders until about 10 weeks old, then were put on the floor with sawdust litter, which we thought was the cause of all our losses. This experience put us out of the poultry business for one year. This year, however, we changed our system and lost only 4%. This was during the first week when they were kept in an electric brooder. After that we never lost a single pullet, and they started to lay when 4 months and 11 days old. Why? Because they had earthworms and sprouted grains. Live food!

Now about our experience with earthworms. We got our first information from Mr. Ralph W. Moltke, Director of the Bureau of Zoological Research, 106 Broadway, Peoria, Illinois. Then we heard of Mr. George Sheffield, Director of the California Earthworm Farms, and purchased his three volumes of instructions, also some earthworm capsules or spawn brick. These were planted as directed, in boxes placed in our basement which is heated by the furnace. We also had several boxes of our native worms in boxes before we heard of Mr. Sheffield's plan. These were obtained by paying school boys 25c per can. They gathered several cans of earthworms by digging down in our bottom land. That was during the fall and winter of 1939. Because of our other business, we did not have time to raise worms in boxes. We dug some pits, built a compost heap as directed, and dumped some of the boxes of worms into these pits. The other boxes were dumped out around the fruit trees. You should see these trees now! They are three times as large as the other trees that were not treated with earthworms.

We have three master pits for our worms. Besides these there is a self-cleaning rabbit hutch with slatted floors. This is where our chickens get most of their earthworms, and it makes a nice shade as we now have several Sumac trees planted all around this hutch. These trees grew 18 feet high in two years.

Then we have another large pit which we excavated for a frog pond. Here we intended to raise frogs, but after investigating a little further we decided to turn it into a master bed for our earthworms. Around this pond we planted some water willows and cattails for shade, and piped the over-flow from our 90 barrel cistern into it for moisture. We also piped a good spring of water 1200 feet from around the east side of the hill—our land faces south. Earthworms must have plenty of moisture, or they will leave for the bottom land. We dumped several bushels of rabbit manure into the pit to feed the worms. The pit is equipped with a drain so it will not get too much water.

Another pit that had been used as a hot bed to raise plants the year before was now planted in ginseng seed and stocked with earthworms. The first winter, ground moles got into the bed and ate most of the earthworms, as well as the ginseng. Another plot of ginseng planted on the river hill was also devoured by the moles. We soaked some grain with strychnine, then put this poisoned grain in can lids in each corner of the bed, thus exterminating the moles. There were several large ant hills in our garden plot. Mr. Sheffield claimed that the ants ate all the fats and sugar out of the soil, making it impossible for the earthworms to survive in this ant infested plot of ground. In fact, I have never seen anything growing on an ant hill. We had a hard time getting rid of these pests. Not wanting to use poison for fear it would kill our worms, we made a mixture of epsom salts, baking soda and saltpeter dissolved in hot water. This solution was poured over the ant hills, and we haven't noticed any ants lately.

Last year we had a wonderful garden—my wife canned over 300 jars of vegetables and fruits. We have two garden plots, one above the house and one below. Last year we tried the no-plowing system. We just ran out a row and planted our potatoes. When they were about 4 inches high we covered the whole patch with a straw litter from the poultry house, leaving only the potato plant tops above the litter. We raised all the potatoes we

could use. This no-plowing system was also tried on tomatoes. We never stuck a hoe in either plot, and had better crops here than where the soil was cultivated. This plot was congested with earthworms. Our upper garden is 165 feet square, worked in three terraces to check the water runoff. Our compost pit is in one corner of this plot. There are 12 fruit trees planted on this plot, and we work between the trees. Our neighbors were surprised at the large solid heads of cabbage we raised in this yellow clay, with only a small shovelful of compost added to each hill.

Some people say that earthworms do not work during the winter months, but we know differently. Last December when there were several inches of snow on the ground, we saw a large mink track around our rabbit hutches. We sawed off two tiers of hutches and started to dig out a hole we thought he was in. The ground was frozen several inches deep, but we found plenty of earthworms working right under this frozen earth—working down over two feet deep. Our garage is located down on the highway; the back water was about 20 inches deep at its crest, and left about 6 inches of sticky mud in front of the garage. When this mud froze it cracked in chunks like brick. While moving these blocks, we found hundreds of earthworms feeding on the under side of these frozen blocks of mud. It is a mystery how these earthworms can survive in these bottom lands when the backwater stays over the land for 8 or 10 days at one time. There were several hundred Cat Fish stranded in pools of water on these bottoms. Everyone in this area had plenty of fresh fish for a week after the flood. Whenever we need worms for fishing bait, we take a kettle of hot water and pour it on the lawn; in a few minutes the ground is covered with worms.

You Will Never Be a Successful Gardener Until You Understand the Following Facts!

Why do you, your stock, and your garden plants get sick?

NOTE—This article represents the introduction to a seed catalogue issued by Arthur Yates and Co., Ltd. of Auckland, New Zealand. It is a handsome publication printed in colors. In this catalogue is advertised, along with seeds, such things as garden equipment, poison sprays, chemical fertilizers and the usual run of supplies. Yet Arthur Yates and Co. advise its customers not to buy its chemical fertilizers. At the top of the page on Pest Control Materials it says: "Its your fault if your garden harbours pests!" Read this amazing article....

IN the early days of New Zealand our virgin lands bore plentiful crops which were affected by few diseases, and nourished a healthy people of remarkable stature, from which small population the celebrated world-beating All Black football team was selected. The soils were then rich with the reserves of humus and minerals which all fertile soils contain. But, by the aid of chemical acid-forming, water-soluble stimulating manures such as Sulphate of Ammonia and Superphosphate in its various forms, these reserves have now largely been consumed. We have been living on the soil's capital and mining the reserves which Nature provided, and now the capital is giving out.

Consider the gradual lapse from the early peak of healthy products to the present day, when farming, orcharding and gardening have become a constant and losing struggle against an increasing host of fungoid, bácterial and insect pests. Consider our ever-growing, and overflowing hospitals. Everyone should know that all life comes from the soil, and we are what we eat, and if the soil is sick, all other forms of life will be sick.

Thousands of New Zealanders remember the time when peach trees grew almost wild, and bore generously, and brown rot and such-like diseases were unknown; and tomatoes grew without the least trouble, and the use of poisonous sprays was unheard of. Today, however, if the weather is unfavorable and muggy, whole orchards of peaches fail, whole crops of tomatoes are lost. The story of New Zealand agriculture is the same old story of the whiskey drinker using up his reserves—he feels fine at the time, but there is always a "morning after the night before." In the Waikato district, one of the greatest users of artificial water-soluble stimulants such as Sulphate of Ammonia and Super, the average useful life of a milking cow, as a result of diseases such as contagious abortion, sterility, etc., is now only three to four milking seasons, which is less than half that of the "good old days" of correct living and manuring.

It is hard to realize what a comparatively few years it took to poison our soils and foods. We have now become a people with some of the worst teeth in the world; about 90% of our children grow up with bad teeth. We are told by our medical examiners for military service that we are fast deteriorating into a C3 nation, incapable of producing many men fit to fight and defend the country without breaking down. For a country with the finest climate in the world, with ample stocks of food, sunshine hours, plenty of clothing, and an outdoor life, this is an absolute disgrace.

The truth is that the theory of chemical fertilization was founded on a misconception. It was argued that because a plant is formed of chemicals they only need to be applied to the soil in chemical form for the plants to get all they need. But this was an unnatural process. The fact that plants do not naturally absorb these chemicals in their chemical form, but extract them from living organisms, was ignored by the founders of Chemical Agriculture.

That the results of forcing unnatural chemical foods on to the plant world would be nearly as fatal as a diet of the chemical constituents of meat and bread in their original form as lumps of iron, etc., would be to man, was overlooked in the early days of chemical manures—about one hundred years ago.

To alter the procedure now, is to fight the vested interests of the chemical world, with their hundreds of millions of pounds capital, with which to buy or kill serious opposition. Some idea as to how powerful the Chemical Superphosphate Works Combine is in New Zealand is gained when we tell you that the Government, for many years past, has yearly paid to this combine something like £1,500,000 (1941) as a fertilizer subsidy, which sum New Zealand taxpayers have to find every year. What for? A particularly interesting fact about this New Zealand fertilizer subsidy is that it is only payable to superphosphate manufacturers, but not to Blood and Bone, Bonedust, Basic Slag, etc., which industries are far more economic and self-supporting secondary industries than Super, which uses practically all imported raw materials. Why? Another significant fact is that you will very seldom hear the Department of Agriculture give favorable mention to any other manure than Superphosphate, which is absolutely wrong, especially when the Government acknowledges that about 90% of all water-soluble phosphates (Super) applied to clays or iron-stone soils are fixed and lost to plants.

Your Manuring Should Mostly Be Done By A Compost Or Humus Heap

The basis of all life starts in the soil, and if health is to be maintained, the processes as laid down by Nature must be followed, which processes are known to the average man as compost, or humus. Only the soil life can change the various complex substances that are added or returned to the soil, into forms that can be assimilated by plant life without becoming unhealthy.

HUMUS is derived from organic matter; it includes the dead residue of plants, animals, worms and insects, together with myriads of live and dead minute organisms. Advanced agricultural scientists tell us there are fifty million individual bacteria in every tablespoonful of *good non-acid humus-supplied soil,* which bacteria double in number every hour while they are

making the minerals and elements available to plants; the amount of healthy growth that plants and grasses make depends on the activity of these bacteria, which tends to be killed by water-soluble acid manures. Numerous complex substances are constantly formed by these hosts of micro-organisms. The normal co-operation, interdependence and efficiency of these various organisms might well be the envy and despair of man's industrial systems.

The reason why many new homes have good gardens to start with is because they dug in an area of grass and weeds, and used up the humus that had accumulated. In many places big rents are paid for grass areas for market gardening. All organic waste and refuse should never be burnt or wasted, whether it be a dead fowl or potato peelings from the kitchen, but should be added to the compost heap, especially now that stable manure is unobtainable. Add everything except tin cans, glass bottles, etc.

So that the amateur gardener will easily understand the necessities for healthy fertility, we have described the requirements under the natural headings as follows:—

Sunshine And Its Heat—Plants grow well in warm districts, but make no growth in cold ones. The energy for the machinery of growth is derived from the sun. The chlorophyll in the green leaf is the mechanism by which this energy is intercepted. The plant is thereby enabled to manufacture food and grow.

The Soil's Air And Oxygen Supply necessitates good drainage. The disintegration process for making humus is an oxidization one which needs air and oxygen. Hence the need for having all of your garden well drained to admit air, and your compost heap not saturated with moisture. As most of the soil organisms possess no chlorophyll and have to work in the dark, they must be supplied with energy which is obtained by the oxidization of humus.

Water Requirements—The composition of all plant life is largely moisture, which must be supplied in the right quantity. As a plant contains about 95% moisture, there will be little germination or growth if this is lacking. On the other hand, on most soils in this country the great trouble is drainage to take away the surplus moisture because New Zealand is classed as one of the world's wet countries. Just as it is necessary to keep the human body well drained and not congested, so the soil's pores must be open and not clogged, which means good drainage.

Lime—The result of the oxidization and rotting of vegetable matter, such as weeds that you dig into the garden, is to form acids. As New Zealand also has a particularly heavy rainfall compared with the rest of the world (30 in. to 100 in. per year), and as rain collects weak carbonic acid from the air, the lime of these soils is steadily used up during millions of years. Our small-boned stock and high percentage of stock diseases, also the poor teeth of our children and the numerous lime deficiency diseases in hospitals, tell of the lack of lime. To maintain the lime requirements, which it is hard to overdo, the amount of lime that should be applied to the average garden each year is four to six ounces per square yard. You can double it the first year.

The above shows how unwise it is to use super (which is half sulphuric acid) for supplying your phosphates. The acids of super also tend to kill the soil life in our wet, sour acid soils.

Minerals—The carcass of any healthy animal contains 36 minerals, which naturally come from the soil. Tests prove that only a trace of some minerals makes all the difference between success and failure. Parts of New Zealand are known as "bush sick," but 4 oz. per acre of cobalt, costing about 1/-, produced prime fat lambs, etc., whereas without it they died of disease. Nature's method of treating minerals to make them available to plants, is the volcano, wherein all the known minerals are melted and oxidised by air and steam, resulting in volcanic soil, which, if treated rightly, will grow the best crops, free of disease. The correct way of introducing minerals that are lacking in soils is either as a natural guano, or as a Basic Slag (which is the product of a volcano), in which the required minerals have been melted and oxidized in the same way as Nature does. Without natural oxidization, the soil life cannot digest and pass minerals on to plants, and they to mankind.

It is sometimes said that making compost and applying it involves an excessive amount of work. The answer is that if the work is put into the healthy fertilization of the land it will not have to be put into fighting diseases. The orchardist, for example, could make a lot of compost in the time he now spends in spray-

ing. Losses of money due to stock mortality would be saved. Returns from crops would be surer, and deterioration in the productive value of the land would be stayed.

This is not a theory. It has been proved an economic fact on many farms in many countries. In England, it was argued that the labor costs of replacing chemicals with compost would be prohibitive, but compost has won out on a business basis. Since biblical times farmers and peasants have fertilized their soils with Nature's manure—compost—and have not been troubled with sickness and disease in plants or animals. For the past four thousand years there have been Chinese, in China, using compost manures. There is a population something like 400 million in China today, fit and capable of defending themselves, as we all know at the present time.

In concluding these remarks on this vital question that badly needs publicity, we would like to say that, although we sell and supply what our customers demand, we have formed our own ideas by generations of experience of the workings of Nature, and we have taken the liberty of expressing some here, although loss of sales of super, insecticides, plants, trees, etc., will result through a general improvement in the health of plant life.—Yours sincerely, for our country against "rackets,"

Arthur Yates & Co. Ltd.

Down With the Plow

Reprinted from TIME MAGAZINE

ONE of the most revolutionary ideas in agricultural history last week had the general approval of U.S. Department of Agriculture officials. The idea: that the plow is a great enemy of man.

Chief exponent of this theory is an Ohio experimental farmer named Edward H. Faulkner. He believes that plowing is responsible for erosion and most other ills of the U.S. soil. He tested his theory by using a cultivation method of his own: instead of plowing he disk-harrowed the soil and planted his crops in the chopped-up surface stubble, weeds and debris. His harvest was astonishing. Many a farmer who reads his newly published report (*Plowman's Folly;* University of Oklahoma Press; $2) may be tempted never to plow again.

A Kentucky farmer's son, longtime county agent and agricultural teacher, Faulkner for 25 years has badgered farmers to tell him why they plow, claims that he never got an answer that made scientific sense. Most farmers plow, he concludes, mainly because they like to. Why is it, Faulkner asks, that when crops in a plowed field become parched and yellow, the weeds in unplowed adjoining fence-rows still grow lush and green? Why do plants in meadows and forests grow prodigiously without cultivation? Because, answers Faulkner, they are fed and protected by decaying plants on the surface of the soil. Plowing buries this organic material beyond the reach of most roots. Besides depriving the new crop of food, the buried vegetation forms a blotter that soaks up moisture from above and below, draws it away from the surface, where it is needed.

The result, Faulkner points out, is to render the bare soil a ready prey to drought or erosion by rain. Appalled at the damage done by the moldboard plow during its 200-year history, Faulkner observes that with all their machinery U. S. farmers get less yield per acre than Chinese peasants. . .

Fruitful Trash

Faulkner rented a farm and conducted a serious test. He grew a thick cover crop of rye, harrowed it in, planted in a surface that looked more like a trash pile than soil. He used no commercial fertilizer, no insecticides. He shocked neighboring farmers by his unorthodox method of planting tomatoes: he simply laid each plant on top of the packed soil and threw a little dirt on its roots. Within 24 hours every plant stood up straight. The source of this idea was an old text-

book picture of a seedbed. Faulkner noticed that while the seedbed was dry, a heelprint in it looked moist; from this he developed his theory that the soil's capillarity (its ability to draw moisture from below) is improved if it is packed rather than loose.

Faulkner's neighbors were still more amazed when they saw the fruit of these monkeyshines. Faulkner's tomatoes, heavier than average, brought premium prices; he grew sweet potatoes in two months instead of the normal four; he harvested five pickings of beans instead of the usual one or two.

Bearded Soil

Farmer Faulkner is sure, on the basis of these results, that abandonment of the moldboard plow would result in immensely richer crops—without artificial fertilizer, lime, insecticides or even cultivating. His method, says he, would ultimately conquer insects (because bugs would find the crops less tasty) and weeds (because they would be killed off as they came up; weed seeds would not be buried and stored for future trouble, as they are by the plow). To the anticipated objection by most farmers that Faulkner's "bearded" soil would be harder to handle than clean plowed land, Faulkner replies: let machinery makers develop new devices to do the job.

Last week the top U.S. soil expert, Soil Conservation Director Hugh Hammond Bennett saluted Faulkner. Bennett pointed out that some pioneering farmers (notably United Fruit Co. and some Cuban sugar-cane growers) have long used a system of cultivation like Faulkner's, called "stubble mulch." The moldboard plow, agreed Bennett, is doomed, except for some special crops and uses.

In its stead, the Department of Agriculture urges farmers to practice "subsurface tillage"—a method using new machinery that cuts off weeds below the surface, leaves the soil with a fertile beard.

Note by Editor of Organic Gardening.

On our farms we experimented with this theory. We planted half of a five acre tract of wheat by plowing and half by the no-plow method. The results were negative. Where we didn't plow, the weeds had a field day and the stand of wheat was sparse. Before this method becomes practical, special equipment will have to be perfected. Also, the land must be conditioned for a few years as described in Mr. Faulkner's book. It certainly pays to read this book because the author describes many organic practices in a most interesting way.

We planted our entire vegetable garden by the no-plow method this spring and found the same discouraging situation about weeds. They come up too fast and too thick. It does not pay to get too excited about something new unless it has a background of practical results.

After having had our little "say" we are appending herewith several letters. The first one was sent to us, the second to Time Magazine. These show good results. Let the reader decide for himself, but if he decides to try this method, let him do so first on a small scale.

Dear Mr. Rodale:

I tried a small patch of corn with the no plowing method and it so turned out that it will be all the corn that I get this year from my first planting, as the rain rotted the seed in the plowed land and nothing grew. The farmer across the road from me planted the same day and he had to replant. He claims that I have a lot of crazy ideas, but admits that the stuff grows, "though, by rights, it shouldn't".

Sincerely,
James W. Spring, Jr.
48 Denny Road,
Chestnut Hill, Mass.

Plowless Proof

Sirs:

Your article "Down With the Plow" (Time, July 26) interested me very much because I have an orchard and vineyard in the Santa Cruz Mountains, Calif., which I planted 18 years ago. I have not plowed this place for 15 years on the theory that plowing. . .would do more damage to the soil than good, as these mountains suffer every year from erosion. . . My trees are more vigorous and produce more fruit than my neighbors'.

Alex Bozant
Los Gatos, Calif.

In conclusion, my further opinion is that if you enrich your soil with organic material it will make very little difference whether you plow or not. If your soil is full of humus, earthworms and bacteria you will not be able to turn up the bad topsoil by plowing because the depth of good soil will be below the plow-line, especially if you do shallow plowing. The disc plow, which does not completely turn over the soil is what we recommend.

Habitation Wastes and Composting in the Sugar Belt

By G. C. Dymond

From Proceedings of South African Sugar Technologists

YOU may at first wonder what the subject of habitation waste disposal has to do with our Association. I have recently had the privilege of seeing some of the work being done in this connection, by a few of the townships in the Union, and of discussing the subject with Government extension officers. After that experience, I felt that here is a matter of importance to the Natal Sugar Industry and its townships, both from a health and from an agricultural point of view.

There are today 15 townships in the Union actually producing compost from wastes, and there are another 13 under construction. (In a letter to Sir Albert Howard dated 4th May, 1943, Mr. van Vuren reported: "We have so far over forty municipalities that have already adopted the scheme and many more are soon to follow.") One town, which has been in production for more than a year, has kindly supplied me with the following data. The population consists of 3,000 European and 1,086 Natives. The quantity of compost made during the first year was 900 tons. This was obtained from the following materials:-

Nightsoil .... approximately 500 gallons daily.
Domestic refuse ..... 3 tons daily.
Extra grass added .... 6 Scotch carts daily.

In addition, all the blood and condemned offal from the abattoir, together with a large amount of coal ash, were used.

The completed compost (3 per cent moisture) is bagged and sold at 2s. per bag. The analysis of the material is as follows:

Moisture	3.06%
Total organic matter ..	30.21%
Nitrogen	0.78%
Total P_2O_5	1.49%
Lime	4.50%
Potash	0.11%

At Ficksburg, experiments and improvements in technique are being carried out by the Government under the enthusiastic direction of J. P. J. van Vuren.

The analysis of the material at Ficksburg is as follows:-

Moisture	14.43%
Total organic matter ..	46.95%
Nitrogen	1.54%
Total P_2O_5	1.00%
Lime	
Potash	1.33%

I do not propose in this article to discuss the actual practice and technique of waste disposal, except in one respect—its mechanization. At one town the staff consists of one European and fourteen Natives, at a probable wage bill of about £900. As this is the price realized for the product, there is no profit. At Ficksburg, the comparative capital cost was £400 and the quality was better.

Now, the principal cost and difficulty in compost making of any kind lies, first, in the construction of the heaps or piles; secondly, in the turning; and lastly, in the final stacking for disposal. In England. large quantities of materials are being composted, the heaps containing charges of from 1,200 to 2,000 tons of material. No description is, however, given as to whether the bulk is manhandled, or dealt with mechanically. It appears to me, therefore, that if large schemes are likely to come into practice. this aspect of the subject should be considered.

I have in mind two possibilities. The first, some simple adaptation of the gantry and grab common in sugar mills for off-loading cane, and, sec-

ondly, the possible use of the mechanical arm.

With regard to aeration, I think that experiments should be conducted to try out the use of compressed air for aerating the heaps. This could to some extent reduce the quantity of turnings required, with the exception of that necessary for fly control.

The Volksrust plant cost £700, and this includes a disintegrating machine with a compressor attached.

Sanitation and Health

Fears have been expressed that such schemes may lead to an increase in disease, in particular amoebic dysentery. Actually the reverse is true, provided the process is properly controlled and conducted on scientific lines. I can only deal briefly with this angle, but here are my authorities for such a statement. (Others are appended.)

J. W. Scharff, Chief Health Officer, Singapore, writes: "I am prepared to prophesy that composting of refuse in our villages, kampongs and estates will cause a revolution in the sanitary organization of our rural areas."

The Secretary of Public Health states: "In the opinion of this Department, there is no likelihood of the matured compost, used as a fertilizer, acting as a medium for the dissemination of the infective material of amoebic dysentery and parasitic worms, *provided* the process of composting has been carried out in accordance with instructions issued by the Department of Agriculture and Forestry, where temperatures of 150° to 160° F. are attained in the compost pits for two or three weeks."

The principal diseases which have as their focal point night-soil, e.g., Human stercus and urine, are:-

1. The enteric group of fevers.
2. Cholera.
3. Dysenteries.
4. Helminthic infestations.
5. Tetanus.

All the pathogenic organisms responsible for these diseases would be killed under the conditions of properly controlled composting. Thus, A.L. Thomson writes: "We know that the heat generated by bacterial activity in properly conditioned and managed compost heaps will destroy all pathogenes, whether bacillary, protozoan or helminthic, inhibit fly breeding and eliminate nuisance."

From a health point of view, therefore, the establishment of these international methods at our factories, estates and villages, is a matter worthy of immediate attention.

Agricultural Value

The day has indeed gone when we can take Mr. G. Ingham's "pleasing delusion cherished by the makers of compost" seriously.

The mounting evidence, that in properly composted soils there is a "pleasing something" which Sir Albert Howard terms the mycorrhizal association which, however, cannot as yet be weighed on the chemist's balance, nor added up in simple unit values, is today indeed a "pleasing actuality" to the makers of Nature's lowly compost.

What is this evidence? I can only give a fraction. In my paper on Pot-testing, I have stated the case of the Uba cane which cured itself of streak disease. It is possible that some of my fellow scientists will not accept this as proof. Years must no doubt pass before science, by tedious tests, will find a name, explain the cause, and finally confirm the facts.

It is a hard thing for agricultural science to do, for it means that all the years and nearly all the work on artificial fertilizers and poison dusts and sprays have been largely wasted in acquiring a vast mass of negative knowledge.

The Western literature on agriculture is full of articles on plant diseases and their treatment. New diseases are constantly being found, and new poisons devised to combat them. Have we all been going down the wrong garden path? For if this is Nature's law in the West, how is it that the plant life of the Orient has not died out long ago? Those ancient people have never had any poison sprays, nor powders to combat the "running out" of varieties so common in our enlightened part of the world.

For example, the varieties of grapes grown in Persia, Afghanistan and on the Western Frontier districts of India have been cultivated for a very long time, but they show no signs of weakness, whereas in the vineyards of the south of France, new varieties are constantly needed to replace the old.

In the United Provinces of India, indigenous varieties of sugar canes have been grown mixed for some twenty centuries, as is indicated by the fact that they have retained their Sanskrit names. Why do varieties persist in the East and run out under Western conditions? Is it not possible that the balance between arable and live stock farming has been upset? The tractor has

maybe much to answer for!

Of China, F. H. King writes: "The average of seven Chinese holdings indicates a maintenance capacity of 1,783 people, 212 cattle or donkeys and 399 swine. That is 1,995 consumers and 399 rough food transformers per square mile of farm land in the rural areas. In the U.S.A. the rural population in 1900 was placed at 61 per square mile of improved farm land and there were 30 horses and mules.

"In China, the maintenance in health of a population of 500 millions depends on the systematic use of vegetable and animal wastes, carefully composted together by age-old skill."

Sir Albert Howard states that in the highly manured areas surrounding the half-million villages in India, which constantly receive dressings of both human and animal manure, he never on any occasion found any trace of disease.

In 1938 I visited Sir Albert Howard at his home at Blackheath. He told me that in 1934 the garden was "a veritable pathological museum"—the fruit trees in particular being smothered with every kind of blight. Steps were taken to convert all the vegetable wastes into humus with the help of stable litter. Even after one year the pests began to retreat. In three years all had disappeared, the woolly aphis on the apple tree being the last to leave. During this period no insecticides were used and no diseased material was ever destroyed. It was all converted into humus." I saw that garden and, as a result, on my return to Africa I commenced my four years' test on streak disease in Uba cane.

One more recent example. Sir Albert Howard grew a collection of Royal Sovereign strawberries, which were badly infected with a common virus disease, alongside with healthy stock. The soil was heavily composted. In 1942 he found no trace of the virus disease. These results have since been confirmed from other sources.

There are many other cases, but today composted soils need fewer and fewer advocates. Every farmer who tries it becomes a disciple for life.

The question is often asked, "How can I make compost at a reasonable cost and in sufficient quantities to fertilize my farm?"

The answer is simple. Start in a small way and work up, with the thought of the forty centuries of China before you. In regard to sugar, every planter knows more or less what seed cane he will require in the following year. Whatever compost he has, or can make on the basis of 10 to 11 tons per beast per year, should be liberally used in specially prepared seed beds or fields. If this becomes universal practice in the sugar belt, there will be little talk in the future of varieties "running out" and less need for the continuous replacements with new varieties, which face our industry under our Western agricultural methods.

There is, however, one danger. "Wars," it has been said, "never settle anything." War, on the other hand, often enforces practices through necessity. Owing to the diminishing artificial fertilizers available today, composting has become such an enforced necessity.

It is possible, however, that after the peace bells ring again, our agriculture will again be flooded and may succumb once more to the propaganda of cheap and easily applied artificial fertilizers. Enforced necessity has laid the foundations of composting in the Union. Enthusiastic Government extension officers are doing a great work. Farmers outside the sugar belt are seeing the results for themselves. Let us continue the good work now and after the war, and compost for the future health of plants and beasts and human beings in this land of ours.

APPENDIX

1. *Towns and Villages in the Union* where the disposal of habitation wastes is in actual practice or in the course of construction:-

Province	
Transvaal	Hercules, Potchefstroom, Heidelberg, Volhard, Alberton, Volksrust.
Orange Free State	Ficksburg, Parys, Clocolan, Bethlehem, Ladybrand, Heilbron.
Natal and East Griqualand	Howick
Cape Province	Walmar, Clanwilliam, and others.

In construction

Belfast, Nylstroom, Potgietersrust.

Matatiele, Dannhauser, Vryheid, Glencoe, Colenso, Margate.

Cradock, Elliot, Goodwood, Porterville.

Reader's Correspondence

Cherry Tree Farm
Little Hampden,
Gt. Missenden,
Bucks, England.
20th July 1943

The Editor,
Organic Gardening
Emmaus, Penna.

Dear Sir,

In the May issue of Organic Gardening you state that you have been against the use of nightsoil in the compost pile; the following may be of interest to you.

Situated, as we are here, right on top of the Chiltern Hills, we have no system of household drainage whatever, consequently means have to be found of disposing of all nightsoil, urine, etc.

The method I adopt, which I find most satisfactory and hygenic, is to have a pile of waste vegetable matter—nettles, grass, weeds, bedding from the poultry and rabbit houses, etc. —near the compost pile. On this pile of vegetable matter is emptied the urine pail, from the earth closet, until the matter is thoroughly saturated. Each day the bucket from the closet, containing nightsoil and dry earth, is tipped out by the side of the compost pile, this is then covered with a layer of the urine saturated vegetable matter.

This process is continued daily, and every two weeks the heap thus formed is incorporated into the compost pile when the usual method of turning, etc. is carried out.

It is a surprising fact that even after only two weeks there is no sign of nightsoil when the heap is forked into the compost pile; neither is there any unpleasant smell or anything objectionable in the process at all.

The important point to watch is that the urine be kept separate from the nightsoil in the closet.

The value of nightsoil in the compost pile can best be judged by results: the resultant quality, taste, and size of the vegetation would satisfy its greatest opponents.

Yours faithfully,
Cecil D. Bachelor

Mr. Rodale:

I sure enjoy your magazine. I never read such sound reading. Would the earthworms have any effect on this heavy adobe (clayey type) of soil?

George Ericson
Berkeley, Calif.

Answer

Dear Mr. Ericson:

Earthworms will gradually build up any kind of soil, even clayey type if you will put plenty of compost in.

Dear Sir:

The street department promises me 20 tons of soil (*silt*, I believe!) cleaned out of a ditch along with sedge-grass, etc. which, I believe, had not gone to seed. Boy! what an addition to the 20 tons of leaves they already gave me, all (if possible) to go out on my fields this fall. You can mention these gifts "to one of our readers," suggesting further and directly that your readers themselves should contact street officials for all such valuable fertilizers, including, too, grass from city parks, parkings, etc.

They also offer me a couple of tons of "black sewage" (needing to be cleaned out of a sewer system). "It's smelly stuff but I put some on my land and boy does it make things grow!" said the superintendent.

Now, what I wish you to take up is this: would it be safe and proper for me to spread this this fall and fall-plow in? Or ought I to leave it "out" for at least a year?

Also, I am now daily cutting down quantities of seed-bearing weeds preparatory to fertilizing and fall-plowing. I'm afraid to leave them lie to "seed" my land, so I gather them into piles, right on the fields, and have in mind burning them there, to destroy the seeds and at the same time leave the rich mineral ash residue. Now I know you have taken the stand that burning stuff on fields makes these spots unfertile and "sterile" though our history book declared the early pioneers of America burned the timber cover, thereafter produced marvelous big crops for a number of years. I am not saying you are wrong and the history book right—I do not definitely know, but want to, if possible.

On how extended an experience do you base your conclusion? Have others of your readers observed land, after stuff has been burned over it, to be sterile and unproductive following?

Eugene Middleton
Murray, Utah

Answer

Dear Sir:

Regarding the sewage material, I strongly suggest that it be composted, as it would be dangerous to put such raw stuff on the land. In fact, as to sewage that once contained or contains some human excrement, there is a question as to whether you would want to use it for crops for human consumption.

Regarding the burning of weeds, our original attention was attracted to this abuse of the land by a government bulletin issued by the Department of Agriculture. We, ourselves, have not made extensive tests about it, but feel certain that it is a bad practice. Originally, the Indians may have burned rich, virgin soil. It was so unusually rich that it probably could have stood a little burning without the bad effects of doing it on ordinary land.

Dear Sir:

My husband, Allen L. Davison, has written to you about the work we are doing here. He is away at this moment but has asked me to write to you.

After r e a d i n g Howard's "Agricultural T e s t a m e n t" there are still some particular points which are in question, as we want to put at least 100 acres of Taliesin under the Indore process of fertilization.

1. In our climate of long winters (1st planting April 15th) when is the best time to put compost on the ground?

2. What happens if compost stays on ground say three months before using, or three extra months in the pit?

3. Is the r i p e compost plowed in or harrowed in, or laid on after harrowing?

4. How is it possible to make a compost heap in our cold winters?

5. Assuming 1500 ton compost for the 100 acres approximately how many feet of cultivated compost would this be?

Mrs. Allen L. Davison
Spring Green, Wisc.

Answer

Dear Mrs. Davison:

Please excuse the delay in replying to your letter of July 9th. In answer to your questions:

1. The best time to put compost in the ground would be in the fall and plow it under.

2. So long as the compost is plowed under, there would be no serious loss before you put in your crop. If, however, you let it stay on top of the ground, there would be some deterioration. Where it is allowed to stay three months extra in the pit, there would be a slight loss, a great part of which could be prevented by covering it with old straw or hay.

3. The best method is to plow the compost under, plowing rather shallowly.

4. Compost heaps cannot be made in the winter time unless you have a large inside building that would be heated. This would be quite expensive.

5. We do not have any figures as to weight of compost per foot.

Dear Sirs:

I wish to ask some questions regarding the compost heap:

1. Upon the 2nd turning (after 8 weeks from its inception) at the bottom of the pile I found a good sized nest of small red ants and the material surrounding it finely broken up. I hesitated to turn that in —am leaving it separate until I hear from you.

2. Also found about 20 cut w o r m s (beauties for size) which I promptly annihilated —but I found no earthworms although there were some in the earth that I used for the compost heap.

3. June issue the article by Dr. Pfeiffer page 15, 3rd column says that the earthworm of the soil shuns the compost heap and the short thick reddish worm thrives on manure. Supposing I breed the latter in the compost heap—will they adjust themselves in the garden s o i l upon transferring them?

4. Page 22—column 1—2nd paragraph also speaks of the compost as a breeding place for worms—what kind?

Will the worms that are advertised in O. G. breed well in the compost heap in its making?

5. If I spade in compost in my vegetable garden this fall, will further spading be necessary next spring or what is the proper procedure before seeding?

E. W. Kessler
Villa Park, Ill.

Answer

Dear Sir:

The answers to your questions were furnished by Dr. Pfeifer as follows:

1st—Ants in a compost heap point always to a too dry condition. They do no harm and the material of ant heaps or the surroundings of them could be mixed with the compost again.

2nd—In turning a compost heap you may occasionally find earthworms and other maggots. I would consider a compost heap as a trap. The cutworms could easily be eliminated in turning the heap. Earthworms are usually not to be found in a fresh heap or in a heap which is completely rotten. They transform a heap into humus, and after their work is done they usually die and decay very quickly.

3rd—The reddish earthworm which lives in the manure and compost does not feed on soil. If the manure and compost is spread on soil and plowed under it will die. The material being transformed by the earthworm is excellent feeding for the bluish soil earthworms. However, if a compost heap is almost transformed, the bluish earthworms may migrate into it. The earthworms in general do not like to be shifted from one type of soil or compost to another. The egg capsules seem to be indifferent and the worms deriving from egg capsules adjust themselves readily to new surroundings.

4th—Egg capsules of any kind inserted into the compost heap will develop if proper conditions for their development are present.

5th—Spading in compost in the fall does not require another spading in the spring except when the soil is very sticky and cakes. Working with a hoe in spring would be sufficient in most cases.

Gentlemen:

In your January 1943 issue appeared an editorial respects Sunflower Seeds.

It intrigues me to inquire whether you know of any way of shelling these seeds and where the equipment, if any, may be obtained. Equipment that will handle good sized batches for feeding purposes.

Also please advise whether grinding and feeding "shell and all" would be injurious to stock of exhibition caliber.

Jan Clespe Foundation
Little Rock, Arkansas

Answer

Gentlemen:

We are sorry that we do not know where shelling equipment for sun flower seeds may be obtained. You might obtain this information by writing to your Agricultural Experiment Station located at Fayetteville, Arkansas.

As to whether grinding would be injurious to stock of exhibition calibre, I could not say definitely. We know that chickens eat sunflower seeds whole and it does them no harm. We also know that steers are fed corn; that is the entire corn, cob and all, ground up, but, of course, to get a fine finish on the steer, no doubt, better results can be obtained by feeding them shelled corn ground up minus the cob part. You might ask this question of your Experimental Station.

Gentlemen:

I have quite a problem on my hands: My ground is infested with "convolvulus" or "perennial morning glory" (with the white flower) and needless to say it gets pulled up with the other weeds and then it goes along with them, onto the compost heap and the vines and roots do not rot, but throw out roots at every joint in the vines (which joints are about an inch apart). Can you tell me of any way in which I can destroy this pest and also any way in which I can cause it to rot in the compost heap? If you can I shall be greatly obliged.

Charles Richardson
Sooke, B. C., Canada

Answer

Dear Mr. Richardson:

We have received the following reply from Dr. Ehrenfried Pfeiffer, which I trust will give you the information you desire."

"In reply to your letter regarding Perennial Morning Glory, there is only one means of getting rid of these vines, that is by frequent cultivation in summer, followed by a system which is usually known as dry cultivation or summer fallowing.

"The only crop which, in moist years, outgrows morning glory is soya beans, therefore, it seems best to grow soya beans after summer fallowing.

"The roots and vines of the morning glory could go into the compost heap but they should be put into the middle of the heap, and should be turned after three to five months. It probably would be better to burn these roots and vines and use the ashes."

Gentlemen:

Will you kindly advise what I can do to our lawn in which

the soil bakes and gets hard as rock each summer and it looks to me that it evidently kills the grasses. As in spring it looks green and nice and later gets so thin and bare looking. Have tried many things like spreading sand over the top, a thin form of peat moss and lots of other things, but I get nowhere with all my work. The soil seems also to get wide cracks at many places.

Is there not something I can throw over the top of the grass that will eventually soften up the soil? It's quite a job to reseed every season and have also dug up the entire area. We are also troubled with crab grass that further does harm to lawn.

Also note you advise bone meal. Isn't there quite a lot of lime in bone meal? Should one omit lime when using bone meal? Is bone meal used sparingly or heavy?

A. G. Dabbert
Park Ridge, Ill.

Answer

Dear Mr. Dabbert:

It probably would be best for you to make over your lawn completely. In this case the present sod, even though it isn't perfect, could be turned over and spaded under and it would help the structure of the soil. Sawdust is a good material that could be used also because it is slightly acid and the lawn should be slightly acid. It would be advisable, therefore, to dig in a lot of sawdust into the soil and also include peat moss or peat humus which is also slightly acid. I would not use lime because that is alkaline. Instead of bone meal, if you can possibly get some horse manure, I would suggest that you use that. Enclosed herewith is a copy of our booklet on making compost.

Each fall you might apply a dressing of purchased peat humus right over the grass and let the rains wash it in. This purchased peat humus is ground very fine and will be absorbed easily into the soil.

Dear Mr. Rodale:

On July 24th I wrote to you concerning a little publicity campaign for "Organic Gardening",—at that time I suggested getting some organically grown produce on the market and letting it speak for itself. I now have what I think is a much better idea, although the first idea still has some merit. Having just moved to the town of Scituate, the enclosed clipping from the Boston Herald, Sept. 3rd., caught my eye. Evidently somebody around this neighborhood has quite a bit of organizing ability and "get up and go". I haven't lived here long enough to know what the local set-up is, but that makes no difference. This afternoon I chanced upon the 4-H Club exhibit set up in one of the stores down town. To be perfectly honest, it was a pretty sad collection of vegetables. For instance, the tomatoes averaged about ¼ lb. and I wouldn't bother to pick fruit less than a pound and have some running 1½ lbs. So far I have picked 2½ bushels from 12 vines and there are another two good bushels to go. These vines were started correctly in a trench of compost and watered and weeded until the end of June. Then, unfortunately for them, I decided to buy this farm down here and I had to let them run. Even with the weeds three feet tall they are doing much better than average. Twelve vines don't sound like much, but they were an experiment,—a very successful one at that! I also tried growing tomatoes from seed, planted May 9th. I have let them run, no staking or tying up and given them a minimum of care. Of course they were planted in plenty of compost on a plot composted now for four years. They are about three weeks behind the plants started in February and are bearing fruit averaging about ¾ lb. This experiment brings up several ideas, which I won't go into now.

In my enthusiasm over the tomatoes, I have strayed well away from the point I was about to make concerning the 4-H clubs. Why not offer prizes for the best vegetables grown a la compost method? If you will send me some of those circulars telling about the method, I'll offer a $10.00 prize for the best tomatoes grown by the compost method in Scituate for next year. I figure that these 4-H kids might be a little less custom-bound about planting, etc., than their fathers. Maybe someone else might be interested in putting up a few prizes in other parts of the country.

Could you tell me if anyone has ever tried to raise cranberries using the compost method, and if so with what results?

Yours truly,
James W. Spring, Jr.
Scituate Center, Mass.

Dear Sirs:—

I received the first issue of Organic Gardening and found it very interesting. The little

squib about Japanese beetles and Chickens was particularly interesting as I think I have something to contribute along that line. Mine has to do with Mexican Bean Beetles. Last summer, due to a shortage of wire, I had no pen for the chickens that I was raising. As a result they wandered where they would and one of their favorite resorts was the vegetable garden near which their house was situated. I noticed that I had practically no bean beetles but at the time didn't think to give the chickens any credit as I was too much annoyed with the damage they did to peas and tomatoes. Everyone else for miles around was complaining of the particularly bad infestation of beetles. It wasn't until this spring when I was planting and got to thinking of the beetles that it occurred to me that there might be any connection. I may be wrong as I haven't seen the chickens in the act but again this summer they have had the freedom of the vegetable garden and I have found exactly one bean beetle in the garden to date. The only pests of any kind that have been there are a few cabbage worms. Otherwise my garden is entirely free of pests.

Have you read Edward Faulkner's Plowman's Folly? It was tremendously interesting and exciting to me and particularly so as that, my issue of Organic Gardening and a piece in the New England Homestead on earthworm tillage all came to hand within a few days of each other. They are all different manifestations of the same theory. It rather seems to me that Mr. Faulkner has gone a little ahead of the Indore Composting process by applying his compost to the soil directly in the growing stage. He skips one whole operation and in this day of labor shortage, that amounts to a good deal.

I have gardened both with flowers and vegetables for a good many years and have never been one to use commercial fertilizers if I could help it. In fact, aside from a little lime, I doubt if I have used fifty pounds in twenty years. If I felt the need of anything, I used bonemeal or cotton seed meal. On Long Island I had a lawn that was nothing but solid crab grass when I took over the place and within three years I had entirely done away with the crab grass without either reseeding or using any chemical fertilizers. I applied cottonseed meal very heavily just as soon as the frost was out of the ground in the spring and the natural grass got such a good start that with the aid of the clippings which I always left on, I soon had the crab grass choked out.

Again thank you for your very interesting magazine.

Yours truly,
Mrs. E. T. Latting,
Andover, N. H.

Dear Mr. Rodale:

Today I received a letter from R. L. Frye, Agricultural Director, Portland Cement Co., 417 Montgomery St., San Francisco, California, regarding gypsum for soils. He has been a science teacher for fifteen years, and is reading Sir Albert Howard's Agricultural Testament and together we are studying the application of your methods to California conditions. The mayor of this city is the assistant manager of the Pacific Press where I am employed, and I have talked over with him the gathering of all the clippings and leaves of the city for compost purposes, at the city dump. They are just now working on the problem of disposal of these items and so I went over with him, your literature on this subject, and he pointed out the individuals I am to see. First he wants me to see the Palo Alto health department who directs the health aspects of the garbage disposal activities in this region. They are in connection with the Leland Stanford University. This city and university are five miles from us.

I would like to report what I am doing in the three gardens I am working, with very different conditions in each. Around our house is an orchard of peaches, pears, figs, almonds and walnuts, with a little interspersing of space for vegetables. Between the rows of trees, we have dug shallow trenches to give surface drainage enough to aerate the soil to at least six inches depth. They also serve as irrigation trenches, and to keep the water from evaporating rapidly, I have filled in a layer of leaves and straw, under which we have put some kitchen garbage, chicken droppings and ground oyster shell flour. That I call a trench composting method. We put enough water on to drench the composting materials, and let them dry so that air will penetrate both the rotting organic matter and the soil on both banks, before we give it another wetting.

The second garden is mostly alkali adobe, so hard that it cannot be worked with anything but pick and crowbar, till the fall rains come. When I wet it, the texture is like gum-

bo. Along one edge where it was most friable, I made alternate trench and long hills every three feet. The potatoes were planted on each side of the furrows of loosened dirt slightly higher than the bottom of the trench between each furrow. I filled the trenches with about two inches depth of straw mixed with a little chicken droppings and lime. That gave the roots a chance to select the extent they wanted to grow up into the dry furrow of loose dirt, or the wet soil under the organic layer. When the plants began growing, I worked the hills of soil a little between them, but as I wet only the trench, and not the soil I had worked up in the spring, the furrow did not become clayey or harden like a brick. The hardest part of this lot, I dug holes every six feet square, with a pick axe, and filled these holes with a nucleus of friable soil from the edges of the lot, with some manure added, and then planted pumpkins and melons. With a hose we watered only the holes where the plants were growing, and then hoed the soil softened by the moisture with lime, manure and soft soil mixed. When the runners began to spread I put a layer of straw around each hill, to hold the moisture and smother weeds that may start among the vines. Thus this hard soil, which was so full of alkali that it formed white flotsam, wherever a pool of water formed, is now growing pumpkins and melons fast. I got here late, so they were planted a few weeks later than they should, and neighbors scoffed that *nothing* would grow there. The potatoes are doing fine, while three weeks ago, every vine grown in an adjoining garden, withered by potato wilt or blight. I wonder if this straw that preserves a constant supply of moisture to the roots, and other organic activity, has built up the resistance of my potatoes, so they did not go as the neighbor's plants did.

The third garden is in fairly good condition, to look at, and is a plot that has been worked by the now evacuated Japanese gardeners. Things started off better in that plot than the other two, and I have just run the water in trenches between every row. About two weeks ago I noticed blight appearing on the tomatoes and potatoes there, and tried to get some copper sulphate and lime to apply on them, but was not able to get it when I wanted it, and every potato is dead, and tomatoes half gone, and I have applied the spray to see if we can save the best plants at least, as they will bear from now till December if we can save them from the wilt. I also put straw in the rows for the tomatoes in this field, but too late to assist them for this season. Something has killed half the hubbard squash plants there also. Even the small potato plants planted six weeks later, have been badly affected by the blight in this more favorable lot, and I have usually found them quite resistant till the stage where tubers begin to form, in former experiences with blight.

I suppose the Portland Cement Company sent you the folders on "How to Make it on the Ranch, COMPOST WITH SOILKORECTIVE No. 2." I have in mind interesting them in gathering the organic matter which is so universally burned in this region. Do you have any suggestions for coordinating their promotion with your program? I have been using their Agricultural Lime made from seashells, but may try some of the gypsum, to see what it will do for the alkali conditions most prevalent in these irrigation areas. I avoided it this year because of the suggestion you made in your magazine, but if it corrects the sodium saturation we find here, and gives us calcium, sulphur, and a trace of iodine, it may fit some conditions we have not found much of in the east, and we easterners do not know much about.

I note accumulations of earthworms under the layers of straw I put in the trenches, but natives here avoid them because they also draw sowbugs, which I also note in some parts of these rows of trench compost. How to find a method of destroying the sowbugs and not the earthworms and mycillium, is the problem.

Sincerely,
H. S. Skadsheim,
Mt. View, Calif.

Answer

Dear Mr. Skadsheim:

Regarding your second paragraph, if you are going to leave the decayed garbage in the trenches and since the trenches are not within the range of the feeding roots of the trees, would it not be more or less wasted unless you took out the decayed matter later and applied it nearer to the tree?

I have heard of trouble in California with citrus fruits where raw garbage was applied. It caused intestinal troubles to persons who ate the fruit. It is important that only thoroughly decayed compost be applied under the trees.

We would be glad to recommend any product of the Portland Cement Company if it is

organic. We have heard from a company that makes gypsum and I believe we wrote you about it a few days ago. I have submitted their letter to Dr. Ehrenfried Pfeiffer for his opinion.

Conditions in California are so foreign to me and to our experiments that it would be a wonderful thing if you could interest some nearby university who might make vitamin tests.

Regarding method for destroying sowbugs, you might get in touch with Dr. Thomas Barrett, Earthmaster Farms, Roscoe, Calif. and Calif. Earthworm Farms, 324 E. Acacia St., Ontario, Calif., as they breed earthworms and would be more familiar with the problems in your part of the country. If you solve this problem, please let our readers know about it.

Dear Sir:

In the July, 1943 issue of the "Organic Gardening" there appears a letter from Mr. H. Skadsheim, Mountain View, California, and your reply to this letter, both of which contain statements wtih reference to agricultural Gypsum which are of particular interest to the writer.

To begin with, Mr Skadsheim stated in his letter to you that he had formerly received a statement from you to the effect that Gypsum was unsuitable for the organic program, and in your reply I note that you feel very much the same when you say "the trouble with Gypsum is that it contains Sulphuric Acid and is a strong fertilizer;" then you go on to state that the Gypsum has a tendency to acidify soil rather than to alkalize it. As to your claim that it has a tendency to acidify the soil—this is very true and accounts for the extensive use of Gypsum on our West Coast soils, of which a major portion of them are alkaline (not acid). For your information, there is used in this area annually from two to three hundred thousand tons of Gypsum plus a large tonnage of other acid materials for the reasons above stated.

The writer was wondering, on the basis of the above facts, if you would care to change your recommendations to Mr. Skadsheim? In any event, a reply would be much appreciated.

Yours very truly,
Pacific Portland Cement Co.
R. L. Frye,
Director Agricultural Division.

We submitted this letter to Dr. Ehrenfreid Pfeiffer who replied as follows:

Dear Mr. Rodale:

I am sorry I cannot say much about gypsum. I have never used it myself and have never heard of it being much recommended. It certainly will acidify a soil and therefore should be handled with reason, even as an addition to an alkaline soil. Calcium sulphate in itself is not an essential plant nutriment. Gypsum has obtained only local interest. As long as it is not overdosed, it may be harmless to bacteria because it will remain more or less inert in the soil.

Very sincerely yours,
E. Pfeiffer.

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Gentlemen:

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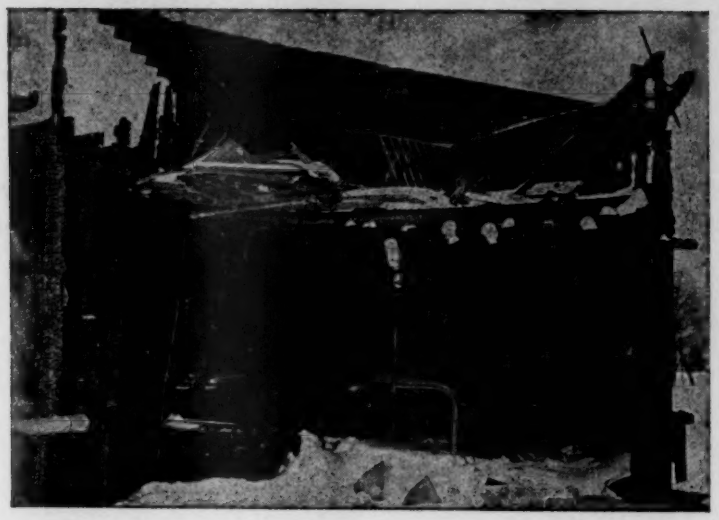

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By Sir Albert Howard, C. I. E., M. A.

Formerly Director Institute of Plant Industry Indore, and Agricultural Adviser to Central India and Rajputana.

Sir Albert Howard C. I. E., M. A.

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This is the recognized standard text book for gardeners and farmers who wish to change from the use of ordinary chemical fertilizers to home-made organic fertilizers. Sir Albert Howard has forty years of active experience in the field of organic fertilizers and is the accepted leading authority on the subject.

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Organic Gardening

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